A HAWK CENSUS ON TEXAS PANHANDLE HIGHWAYS

BY PHILIP F. ALLAN AND PALMER R. SIME

THE Texas Panhandle offers an almost unparalleled opportunity for the observation of hawks. The broad expanses unobscured by trees or hills, the predominance of clear days with excellent visibility, and the uniformity of landscape combine to make unusual or moving objects conspicuous and the observation of hawks easy.

The Panhandle is that part of Texas north of a line drawn diagonally from Childress County, at the southwest corner of Oklahoma, to Winkler County, at the southeast corner of New Mexico. Most of the Panhandle is made up of treeless short-grass plains of 3,000 to 4,000 feet elevation. It is dissected by intermittent or shallow permanent streams, with wooded banks. Approximately a third of the Panhandle consists of rolling, mid- or tall-grass plains, often covered with sagebrush and oak shinnery. Elevations here are about 1,500 to 2,000 feet. Between the easterly rolling plains and the westerly high plains is an abrupt break, rising sharply. This area is characterized by canyons and buttes, often sparsely covered by grasses, junipers, and deciduous shrubs. Abrupt cap-rock rims lie immediately below the high plains.

Stimulated in part by the sight of large flocks of Swainson's Hawks in migration, the authors, whose regular work required much automobile travel, decided to keep a record of hawks, kites, vultures, and eagles seen en route. The method of observation was essentially that used by Nice (1934) and others; that is, miles traveled and hawks seen were recorded. In contrast to other highway bird observations, these were confined to a comparatively small area, the Texas Panhandle.

The trips were made at random between October, 1938, and January, 1942. A total of 26,768 miles was driven. Most of our trips were separate, but occasionally we traveled together. Although both of us covered most of the Panhandle at one time or another, Allan's observations were made particularly in the northern portion, while Sime's were made in the southern part. A convenient data sheet was used, upon which was recorded the origin and destination of trips, date, speedometer readings, miles traveled, and number of hawks of each species seen. It was found impracticable for one man to record the exact location of each observation, the habitat type, and other information while traveling, so early efforts to obtain these data were abandoned.

After some trials in analyzing the data, we decided to group the records into quarters of the year. These seem to be more comparable than individual months. Beginning with November, 1938, the data were grouped to cover 13 consecutive quarters. The three months of fall migration—August, September, and October—were placed to-

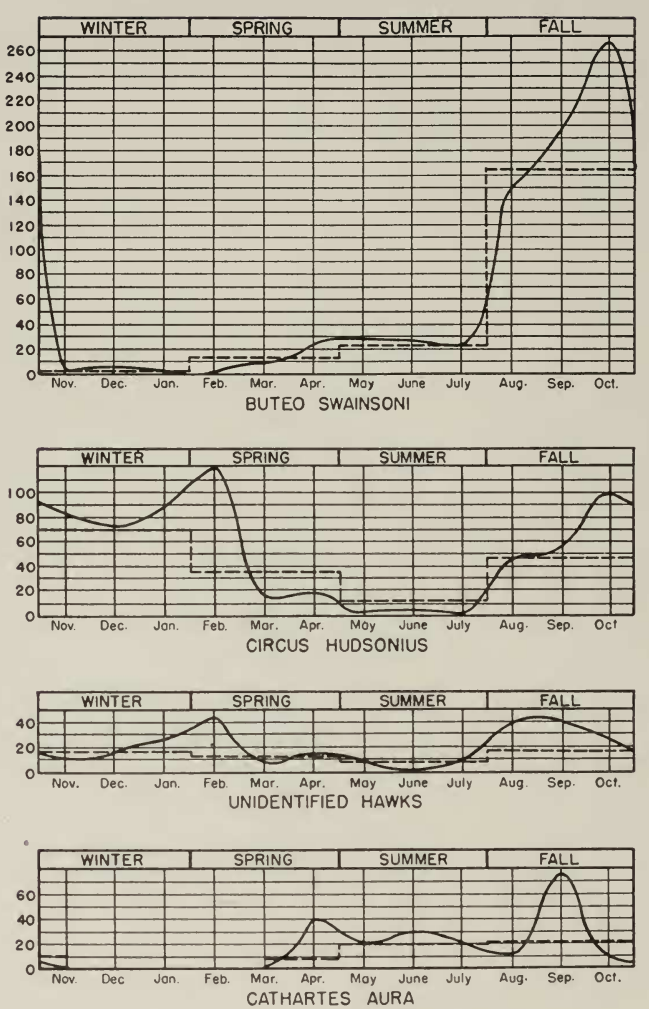

Figure 1. Population trend, based on the rate per thousand miles traveled. The solid line represents the monthly average; the broken line the seasonal average.

gether. Thus November, December, and January are "winter"; February, March, and April are "spring"; and May, June, and July are "summer." Although the data are somewhat meager for some months, we believe that annual population trends are fairly well indicated in Figures 1 and 2.

The individuals of each species were totaled by quarters, and the relative abundance of each was determined (Table 6). The number of miles of travel per hawk of each species was calculated, and converted to the number of each species seen per 1,000 miles of travel. The results of these calculations appear in Tables 2 to 5 inclusive. (In the tables, the data are arranged under "seasons" as defined above.)

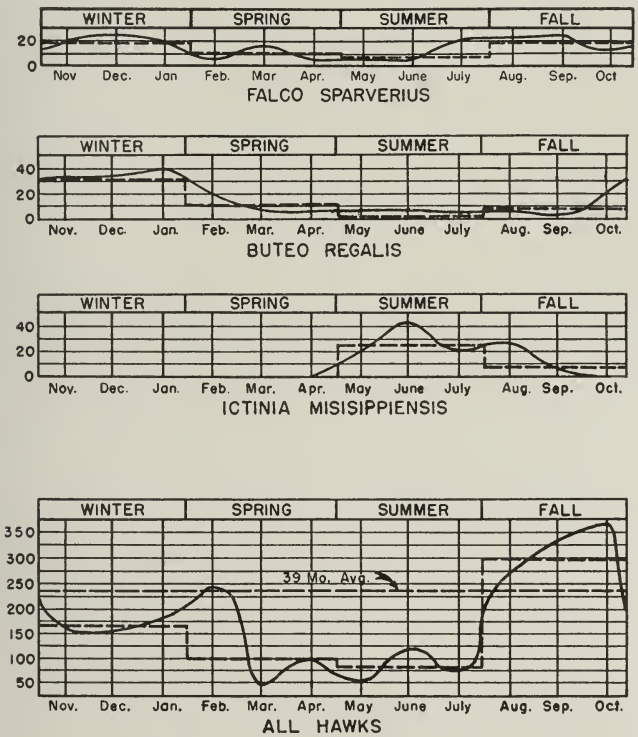

Figure 2. Population trend, based on the rate per thousand miles traveled. The solid line represents the monthly average; the broken line the seasonal average.

It is interesting to compare our data on hawks (Table 1) with those of Mrs. Nice. The figures on vultures for the Texas portion of her trip are remarkably close to ours of 1939 and 1941. There is, however, considerable difference in hawk figures. Our observations show that the summer months are relatively poor for obtaining records. It is difficult to see hawks unless they are in flight, and during the heat of the day they are likely to be resting in the shade.

TABLE 1

COMPARISON OF HAWK POPULATIONS RECORDED BY NICE (1933) AND ALLAN AND SIME (1939-1941)

June-July	Miles	Hawks		Vultures		Birds		Location	Authority
		No.	Miles Per	No.	Miles Per	No.	Miles Per		
1933	6,349	50	127.0	70	90.7	120	52.9	Ohio-Ariz.*	Nice
1933	557	7	79.6	16	34.8	23	24.2	Texas**	Nice
1939	1,470	115	12.8	41	35.9	156	9.4	Tex. Panhandle	Allan and Sime
1940	200	8	25.0	4	50.0	12	16.7	Tex. Panhandle	Allan and Sime
1941	566	31	18.3	16	35.3	47	12.0	Tex. Panhandle	Allan and Sime

*Round-trip part of travels.
**Texas part of travels.

While there was some concentration of hawks along highways, we were unable to detect how much the perching sites and carrion to be found there attracted them. Much of the travel was done on ranch roads, and there seemed to be as many hawks along them as there were along major highways.

Fifteen species were observed. It is probable that at least three more species occur at times in the Texas Panhandle. J. O. Stevenson (1942) records the Harris Hawk (*Parabuteo unicinctus harrisi*) from Palo Duro Canyon, and Florence M. Bailey (1928) attributes to Ligon a record 50 miles northeast of Carlsbad, New Mexico, which is 25 to 30 miles west of Gaines or Yoakum counties, Texas. The Black Vulture (*Coragyps atratus*) occurs not far south of the Panhandle. Pigeon Hawks (*Falco columbarius*) may occur as stragglers or uncommon migrants, but we have not positively recognized them. E. T. Seton (correspondence) informs us that a female of Richardson's Pigeon Hawk was taken by him on the Perico Ranch in Union County, New Mexico, which is 25 to 30 miles west of Dallam County, Texas.

Cathartes aura. Turkey Vulture (Figure 1).—Earliest spring record: April 1, 1941. Latest fall record: October 15, 1940. On April 19, 1939, 43 were seen in 80 miles, or 1 per 1.9 miles. (Hereafter, the ratio of miles traveled to birds seen is expressed numerically, thus: 1.9:1.) During April, 1940, 20 were seen in 237 miles (11.8:1). On September 25, 1939, 132 Turkey Vultures were seen in 183 miles (1.4:1). During the month of September, 1939, 189 Turkey Vultures were seen in 2,535 miles of travel (13.4:1). Our data show migration peaks in April and September (Figure 1). In the Texas Panhandle this bird was found principally in canyons and wooded river bottoms.

Ictinia misisippiensis. Mississippi Kite (Figure 2).—Earliest summer record: May 4, 1939. Latest fall record: September 25, 1939. The largest number for

one day was recorded on May 28, 1939: 23 seen in 79 miles (3.4:1). The high day in fall was August 30, 1939: 23 in 307 miles (13.3:1). High month was May, 1940: 29 seen in 585 miles (20.1:1). High fall month was August, 1939: 36 seen in 1,470 miles (40.9:1). The Mississippi Kite seemed to be principally confined to wooded bottomlands. It was common in the northeastern Panhandle and ranged at least as far west as Potter County. Bent (1937) indicates its occurrence at Tascosa (Oldham County), west of Potter County.

Accipiter velox. Sharp-shinned Hawk.—This bird was scarcer than the Cooper's Hawk. Only 8 were seen. Like the preceding species, it frequents the heavily wooded bottoms. Paul Russell found it in summer in Palo Duro Canyon, according to J. O. Stevenson.

Accipiter cooperi. Cooper's Hawk.—This was one of the rarer hawks, but it is rather shy and frequents the more heavily wooded valleys; hence it may have escaped our notice. It seems to be only a transient here.

Only 14 were seen. The habits of this and the preceding species are so different from those of the other species treated in this paper that our figures can give no real indication of relative numbers.

Buteo borealis. Red-tailed Hawk.—The Red-tail, primarily a winter bird in the Texas Panhandle, is relatively uncommon, but by no means rare. J. O. Stevenson informed us that Redtails have been observed in Palo Duro Canyon in summer by Russell. It is a bird of wooded rangeland, particularly of canyons and river bottoms. Earliest fall date: August 1, 1939. Latest in summer: May 9, 1941. Highs in single day observations were January 12, 1939: 4 seen in 57 miles (14.2:1); and October 23, 1939: 6 seen in 85 miles (14.2:1). High month was October, 1938: 5 seen in 150 miles (30.0:1). January, 1939, however, is probably a fairer sample: during this month 9 were seen in 673 miles (74.8:1).

Buteo swainsoni. Swainson's Hawk (Figure 1).—The huge flocks of migrating Swainson's Hawks have been described many times. To a certain extent this migration disrupted our data, for in September and October, 1939, we observed 1,961 of these hawks—a record we never again approached. In random travels it is possible to miss large concentrations of hawks, as we apparently did in 1940 and 1941, for large flocks were reported to us during those years. There is some reason to believe that 1939 was unusual, for it was a year of very dry weather and an abundance of grasshoppers.

When not migrating, flocks of Swainson's Hawks frequent the egg-laying beds of grasshoppers, sometimes in flocks of a thousand or more.

In migration, the flocks are a loose group of flapping, wheeling, and soaring birds, moving from ground level to the limits of visibility. Sometimes the horizontal movement is relatively slow, while at other times the flock moves rapidly. On one occasion following a raw, rainy day, 641 hawks were counted in about an hour's time. On this day, October 9, 1939, the weather was clear and cool, with a strong northwest wind.

The Swainson's Hawk is a common summer resident in the Panhandle, nesting nearly everywhere that there are a few cottonwood trees. Earliest record for arrival: March 28, 1941. Latest one seen: December 7, 1938. Our high one-day record for spring is April 19, 1939: 30 seen in 80 miles (2.7:1). The high spring month was May, 1939. In 1,131 miles of travel we saw 58 (19.5:1). Our high day for fall was October 9, 1939: 641 seen in 35 miles (.05:1). On August 30, 1939, we saw 214 in 307 miles (1.4:1); on September 17, 1939, our record was 155 hawks in 165 miles (1.1:1). On September 27, 1939, 397 passed over Amarillo, Texas, but these do not appear in our statistical data, since they were not observed in the course of our travels. On September 26, 114 were seen in a 70-mile trip (.6:1). September and October, 1939, were the high fall months. During September we recorded 1,224 Swainson's Hawks in 2,535 miles of travel (2.1:1); and during October we recorded 737 in 1,381 miles (1.9:1). In August, 1941, 573 miles were traveled and 62 hawks seen (9.2:1).

Swainson's Hawks were abundant in all types of habitats, but were predominant on rangeland. They often were perched on telegraph wires, a habit unusual in large birds. Among the foods are cottontails and jackrabbits killed by automobiles. A young Swainson's Hawk was seen on one occasion to make a very awkard and unsuccessful stoop at a Horned Lark (*Octocoris alpestris*).

Buteo lagopus. American Rough-legged Hawk.—This uncommon hawk is a winter resident only. Earliest winter record: November 2, 1938. Latest record in spring: April 21, 1939. This seems to be an unusually late date, and the bird may have been weak or injured. The April 1, 1941, date is more likely normal. American Rough-legs were so scarce that mileage records are hardly significant. The high month was February, 1940, when 7 were seen in 372 miles of travel (53.1:1). In December, 1938, we saw 14 in 1,144 miles of travel (81.7:1), and in February, 1939, we recorded 7 in 846 miles (120.8:1).

Because this species is slow and unafraid, many are killed by hunters, who find them easy targets along highways.

Buteo regalis. Ferruginous Rough-legged Hawk (Figure 2).—This is a year round resident of the Panhandle. Some of the nests are huge. The accumulations of nesting materials of many seasons evidently account for their size. One large nest in Moore County was located in a hackberry (*Celtis sp.*). This nest was about 4 feet in diameter and nearly 3 feet thick and supported the weight of a man. In 1939, three young Rough-legs were raised here, but in 1940 and 1941, the nest was occupied by Great Horned Owls (*Bubo virginianus*). Interestingly enough, an unoccupied nest was discovered in 1940 on the bare ground not far from the large nest.

High day for Ferruginous Rough-legs was December 7, 1938: 18 were seen in 112 miles (6.2:1). On November 11, 1938, 18 were seen in 125 miles (6.9:1). High month was December, 1938: 66 were seen in 1,144 miles of travel (17.3:1).

During the breeding season this hawk occurred only on rangeland, but later was seen almost everywhere. As with the American Rough-leg, many are killed along highways.

Aquila chrysaëtos. Golden Eagle.—Although a year round resident, the Golden Eagle was seen mainly during the winter months, and then only uncommonly. It nested in Palo Duro and Cito canyons in Randall County, and in 1941 was observed nesting in a large cottonwood in Hartley County. During the month of January, 1942, we saw 6 in 656 miles (109.3:1).

The Golden Eagle in the Texas Panhandle, as elsewhere in the west, is principally a bird of canyons and rangeland.

Haliaeetus leucocephalus. Bald Eagle.—Only one Bald Eagle was recorded, though it is reported as being not unusual in the Panhandle of Oklahoma.

Circus hudsonius. Marsh Hawk (Figure 1).—The Marsh Hawk is essentially a winter bird in the Texas Panhandle, although it appears early and stays late. During the wet summer of 1941 it nested in Randall County. A nest was found May 30, 1941. Marsh Hawks usually appeared early in August (August 1, 1939, 1941) and became scarce after April. Latest summer date: June 30, 1939. The high day for fall was September 9, 1939: 37 seen in 83 miles' travel (2.2:1). On February 1, 1940, 32 were seen in 116 miles (3.6:1), and on January 10, 1942, 37 were seen in 120 miles (3.2:1). Some of the high months were February, 1940: 74 seen in 372 miles (5.0:1); November, 1941: 88 in 527 miles (5.9:1); December, 1941: 133 seen in 948 miles (7.1:1); and January, 1942: 115 seen in 656 miles (5.7:1). The numbers of Marsh Hawks during several other months were fairly high. More Marsh Hawks were observed than any other species except the Swainson's Hawk. A total of 1,374 was seen in 26,768 miles' travel (19.5:1). Migration peaks apparently occurred in February and October (Figure 1).

While the Marsh Hawk is ubiquitous, it frequents croplands, especially cotton and sorghum fields, more than it does pasture. As would be expected, it was often seen near playas (wet-weather lakes). Marsh Hawks were particularly abundant in areas having large populations of cotton-rats (*Sigmodon hispidus*). The remains of this rodent were found in a fresh Marsh Hawk pellet, and nearby there were two dead cotton-rats. Jack rabbits and cottontails killed on the highway are a staple and abundant source of food. We witnessed an unsuccessful attack on a covey of Scaled Quail (*Callipepla squamata*), and we found Marsh Hawks eating Meadow Larks (*Sturnella neglecta*) and ducks, the latter presumably wounded.

Pandion haliaëtus. Osprey.—Ospreys were rare migrants through the Texas Panhandle. En route they obtain food in some of the larger lakes, where they were found fishing. Six Ospreys were seen, but only 4 of these figure in our data. One was seen on a power line pole on September 26, 1941, in Amarillo, Texas. Another was observed on June 18, 1942, at Buffalo Lake, Randall County.

Falco mexicanus. Prairie Falcon.—The Prairie Falcon was uncommon and was seen principally in the winter, although occasionally at other times. Summer observations lead us to believe that it may nest in some of the canyons. Although January, 1941, showed fewer miles per bird (93.0:1), so few miles were traveled during that month that it is best that October, 1939, be considered high. In this month, 15 were seen in 1,381 miles (92.1:1).

This falcon was seen about equally in rangeland and cropland. Like its larger relative, the Duck Hawk, it sometimes winters in cities. One frequented the larger buildings at Amarillo during the winters of 1938 and 1939. Also, like the Duck Hawk, this bird is sometimes seen at play. On one occasion a Prairie Falcon was observed making repeated stoops at a Ferruginous Rough-leg. The latter rolled over in air and presented a formidable defense, which caused the little falcon to swoop upward. On another occasion, a Prairie Falcon and a Marsh Hawk were observed in what appeared to be a game. The two maneuvered in such a manner as to be facing each other about 10 feet above the ground. They then rose vis-à-vis, keeping about three feet apart, to a height of about 50 feet, when they separated, dove earthward, and then repeated the trick. This continued for about three minutes.

Falco peregrinus. Duck Hawk.—The Duck Hawk was decidedly rare. Only three were seen on our travels, but two or three more have been seen when we were not traveling.

Falco sparverius. Sparrow Hawk (Figure 2).—This hawk ranked fourth in abundance and is a year round resident. It was most abundant in winter. Our high day was December 1, 1940: 10 seen in 36 miles (3.6:1). September 9, 1939, was also a high day: 10 seen in 83 miles (8.3:1). High fall month was December, 1941: 40 seen in 948 miles (23.7:1); and high spring month was April, 1939: 45 seen in 2,413 miles (53.6:1). August, 1941, (28.6:1), September, 1939 (34.7:1), and January, 1939 (32.0:1), were also high months. Migration data did not show well defined peaks.

This hawk generally frequents areas of tree growth and was commonly seen along railroad right of ways, sitting upon telegraph poles. One is likely to see Sparrow Hawks nearly anywhere in the Panhandle.

Unidentified hawks. It is to be expected that in a survey of this kind many hawks would be unidentified. Whenever it was convenient to do so, questionable identities were checked with a 7x35 binocular. Melanistic hawks, with the occasional exception of Swainson's Hawk and Ferruginous Rough-legs, were usually unidentifiable. Most of the unidentified birds were buteonine. We believe that all birds listed in the accompanying tables as unidentified hawks actually *were* hawks. We were careful to exclude Ravens and Mourning Doves.

TABLES 2 and 3

ABUNDANCE OF HAWKS BY SEASONS

Species	Winter 1938-1939		Spring 1939		Summer 1939		Fall 1939	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Turkey Vulture	..	..	81	21.2	54	20.7	213	39.5
Mississippi Kite	..	..	..	..	70	26.9	47	8.7
Sharp-shinned Hawk	2	.7	..	..	2	.8	2	.4
Cooper's Hawk	8	2.8	2	.5	..	..	2	.4
Red-tailed Hawk	26	9.0	16	4.2	..	..	15	2.8
Swainson's Hawk	2	.7	120	31.3	106	40.8	2239	416.7
American Rough-legged Hawk	24	8.3	9	2.3	..	..	..	..
Ferruginous Rough-legged Hawk	136	47.2	44	11.5	12	4.6	25	4.6
Golden Eagle	6	2.1	6	1.6	2	.8	4	.7
Bald Eagle	..	..	1	.3	..	..	..	..
Marsh Hawk	178	61.7	85	22.2	8	3.1	354	65.8
Osprey	..	..	..	..	..	..	4	.7
Prairie Falcon	17	5.9	2	.5	2	.8	26	4.8
Duck Hawk	..	..	..	..	..	..	3	.5
Sparrow Hawk	58	20.1	71	18.5	14	5.4	118	21.9
Unidentified	74	25.6	70	18.2	14	5.4	176	32.7
Totals:	531	185.2	507	131.6	284	108.7	3228	588.2
Miles traveled during period:	2,887		3,834		2,601		5,384	

Species	Winter 1939-1940		Spring 1940		Summer 1940		Fall 1940	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Turkey Vulture	..	..	20	15.0	22	28.0	2	3.3
Missisippi Kite	..	..	..	..	29	36.9	..	..
Sharp-shinned Hawk	..	..	..	..	..	..	1	1.7
Cooper's Hawk	..	..	1	.8	..	..	..	..
Red-tailed Hawk	13	7.5	3	2.4	..	..	4	6.7
Swainson's Hawk	2	1.1	3	2.4	7	8.9	4	6.7
American Rough-legged Hawk	5	2.9	7	5.6	..	..	..	..
Ferruginous Rough-legged Hawk	26	15.0	15	12.1	2	2.5	9	15.0
Golden Eagle	1	.6	3	2.4	..	..	..	..
Bald Eagle	..	..	..	..	..	..	..	..
Marsh Hawk	84	48.5	79	63.7	1	1.3	28	46.7
Osprey	..	..	..	..	..	..	..	..
Prairie Falcon	5	2.9	4	3.2	..	..	1	1.7
Duck Hawk	..	..	..	..	..	..	..	..
Sparrow Hawk	10	5.8	14	11.3	5	6.4	3	5.0
Unidentified	12	7.0	26	21.0	..	..	8	13.3
Totals:	144	90.1	147	146.3	66	84.0	60	100.1
Miles traveled during period:	1,730		1,239		785		600	

*Number per 1000 miles of travel.

TABLES 4 and 5

ABUNDANCE OF HAWKS BY SEASONS

Species	Winter 1940-1941		Spring 1941		Summer 1941		Fall 1941	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Turkey Vulture	..	..	1	.8	27	16.7	18	21.2
Mississippi Kite	..	..	..	..	23	14.2	..	..
Sharp-shinned Hawk	..	..	..	..	..	..	..	..
Cooper's Hawk	..	..	..	..	..	..	..	..
Red-tailed Hawk	2	1.1	..	..	2	1.2	1	1.2
Swainson's Hawk	1	.5	6	4.6	21	13.0	66	77.5
American Rough-legged Hawk	2	1.1	2	1.5	..	..	..	..
Ferruginous Rough-legged Hawk	71	39.2	9	6.1	3	1.8	7	8.2
Golden Eagle	1	.5	..	..	..	..	..	..
Bald Eagle	..	..	..	..	..	..	..	..
Marsh Hawk	95	52.4	19	14.7	11	6.8	50	58.5
Osprey	..	..	..	..	..	..	..	..
Prairie Falcon	6	3.3	1	.8	1	.6	1	1.2
Duck Hawk	..	..	..	..	..	..	..	..
Sparrow Hawk	33	18.2	4	3.1	4	2.5	29	34.1
Unidentified	16	8.8	13	10.0	15	10.2	7	8.2
Totals:	227	125.0	55	42.5	107	66.2	179	212.8
Miles traveled during period:	1,812		1,295		1,617		850	

Species	Winter 1941–1942		Total Period 1938–1942	
	Number	Rate*	Number	Rate*
Turkey Vulture	..	..	438	16.4
Mississippi Kite	..	..	169	6.3
Sharp-shinned Hawk	1	.5	8	.3
Cooper's Hawk	2	.9	15	.6
Red-tailed Hawk	15	7.0	97	3.6
Swainson's Hawk	1	.5	2578	96.2
American Rough-legged Hawk	4	1.9	53	2.0
Ferruginous Rough-legged Hawk	56	26.2	415	15.5
Golden Eagle	9	4.2	32	1.2
Bald Eagle	..	..	1	tr.
Marsh Hawk	336	158.7	1374	51.3
Osprey	..	..	4	.2
Prairie Falcon	10	4.7	76	2.8
Duck Hawk	..	..	3	.1
Sparrow Hawk	70	32.9	433	16.2
Unidentified	48	22.5	479	17.9
Totals:	555	263.2	6175	232.5
Miles traveled during period	2,131		26,768	

*Number per 1000 miles of travel.

TABLE 6

RELATIVE SEASONAL ABUNDANCE OF HAWKS BY PERCENTAGE

	Turkey Vulture	Mississippi Kite	Sharp-shinned Hawk	Cooper's Hawk	Red-tailed Hawk	Swainson's Hawk	American Rough-legged Hawk	Ferruginous Rough-legged Hawk	Golden Eagle	Bald Eagle	Marsh Hawk	Osprey	Prairie Falcon	Duck Hawk	Sparrow Hawk	Unidentified
Winter '38-'39	..	..	.4	1.5	4.9	.4	4.5	25.6	1.1	..	33.3	..	3.2	..	10.9	13.9
Spring 1939	16.0	..	..	.4	3.2	23.7	1.8	8.7	1.2	.2	16.8	..	.4	..	14.0	13.8
Summer 1939	19.0	24.6	.7	..	..	37.3	..	4.2	.7	..	2.8	..	.7	..	4.9	4.9
Fall 1939	6.6	1.5	tr.	tr.	.5	69.4	..	.8	.1	..	11.0	.1	.8	tr.	3.6	5.5
Winter '39-'40	..	.	..	..	8.2	1.3	3.2	16.4	.6	..	53.2	..	3.2	..	6.3	7.6
Spring 1940	11.4	..	..	.6	1.7	1.7	4.0	8.6	1.7	..	45.1	..	2.3	..	8.0	14.8
Summer 1940	33.3	43.9	..	..	..	10.6	..	3.0	..	..	1.5	..	..	..	7.6	..
Fall 1940	3.3	..	1.7	..	6.7	6.7	..	15.0	..	..	46.7	..	1.7	..	5.0	13.3
Winter '40-'41	..	..	..	..	.9	.4	.9	31.3	.4	..	41.8	..	2.6	..	14.5	7.0
Spring 1941	1.8	..	..	..	..	10.9	3.6	16.4	..	..	34.5	..	1.8	..	7.2	23.6
Summer 1941	25.2	21.5	..	..	1.9	19.6	..	2.8	..	..	10.3	..	.9	..	3.8	14.0
Fall 1941	10.0	..	..	..	.6	36.9	..	3.9	..	..	27.9	..	.6	..	16.2	3.9
Winter '41-'42	..	..	.2	.4	2.7	.2	.7	10.1	1.6	..	60.5	..	1.8	..	12.6	8.6

AVERAGE RELATIVE SEASONAL ABUNDANCE

Winter	..	..	.2	.6	4.2	.6	2.3	20.8	.9	..	47.2	..	2.7	..	11.1	9.3
Spring	9.7	..	..	.3	1.6	12.1	3.1	11.2	1.0	tr.	32.1	..	1.5	..	9.7	17.4
Summer	25.8	30.0	.2	..	.6	22.5	..	3.3	.2	..	4.9	..	.5	..	5.4	6.3
Fall	6.6	.5	.6	tr.	2.6	37.7	..	6.6	tr.	..	28.5	tr.	1.0	tr.	8.3	7.6
Totals*	7.1	2.7	.1	.2	1.6	41.7	.8	6.7	.5	tr.	22.3	tr.	1.2	tr.	7.0	7.7

*Entire 39-months' period.

These are practically the only birds that might be confused with hawks in highway observation; the former might be mistaken for any of the larger hawks, while the latter are similar in size to the Sparrow Hawk. The unidentified hawks make up 7.7 per cent of all hawks observed, and the abilities of both of us as seen in our ratios of identified to unidentified birds are remarkably close. Excluding the large flocks of Swainson's Hawks, most of which were observed by Allan, there was less than 3 per cent difference in the ratios.

High points in the population curves of unidentified hawks (Figure 1) occur in August, September, and February. It is likely, therefore, that many of them are Swainson's Hawks in the fall, and that Marsh Hawks predominate in the spring.

Summary

Physiographic and climatic conditions in the Texas Panhandle present excellent opportunities for highway hawk-censuses.

During a highway census covering a 39-month period (1938-1942) 6,175 hawks (including kites, vultures and eagles) were observed in 26,768 miles of travel.

With Swainson's Hawks and Marsh Hawks far outnumbering all others, 15 species were recorded out of a possible total of 18.

Hawks were seen at the rate of 232.5 per 1,000 miles, or one bird per 4.2 miles.

Literature Cited

Bailey, Florence M.
1928. Birds of New Mexico. N. M. Dept. of Game and Fish, Santa Fe, N. M.

Bent, Arthur C.
1937. Life Histories of North American Birds of Prey. Part I. *U. S. Nat. Mus. Bull.* No. 167.

Nice, Margaret M.
1934. A Hawk Census from Arizona to Massachusetts. *Wilson Bulletin,* 46: 93-95.

Stevenson, James O.
1942. Birds of the Central Panhandle of Texas. *Condor,* 44: 108–115.

Soil Conservation Service, Washington, D.C., and U. S. Army, Lubbock, Texas